

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
&  
AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport  
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## Flight,

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## CONTENTS

	PAGE
Editorial Comment	155
The R.A.F. and Iraq	156
The Loth Guide Cable	156
American Research on Thick Aerofoils	156
London-Paris from the Air: No. 29. Views of Paris	157
Huff-Daland Biplane	158
Notices to Airmen	160
Notice to Ground Engineers	160
Royal Aero Club Official Notices	161
London Terminal Aerodrome	162
The Loth Guide Cable	163
Some Notes on Aeroplanes, with Special Reference to Route from Cairo to Baghdad	164
The R.A.F. and the Middle East	165
Geddes National Expenditure Cuts and Air Estimates	166
In Parliament	166
London Aero Models Association	168

## DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

- Mar. 16 .... Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
- Mar. 23 .... Lecture, "Some Notes on Commercial Aircraft," by S. H. Evans, before Students' Section, R.Ae.S.
- Mar. 26-  
April 2 Nice Meeting
- Mar. 30 .... Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
- Mar. 31 .... Lecture, "Aircraft Design" by H. P. Folland, before I.Ae.E.
- April 7 .... Lecture, "Some Outstanding Problems in Aeronautics," by Professor L. Bairstow, before Students' Section, R.Ae.S.
- April 17 .... R.Ae.C. Race Meeting, at Waddon
- April 17-19 Seaplane Contest, Marseilles
- June 1 .... Entries close for Schneider Cup Race
- June 5 .... R.Ae.C. Race Meeting, at Waddon
- June 23-25 International Competition for Touring Aeroplanes, Brussels
- July 6-20 French Gliding Competition
- Aug. 6 .... Gordon-Bennett Balloon Race, Geneva
- Aug. 7 .... R.Ae.C. Race Meeting, at Waddon
- Aug. (last fortnight) Schneider Cup Seaplane Race, at Naples
- Sept. .... Tyrrhenian Cup, Italy

## INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

## EDITORIAL COMMENT

**D**URING the debate on the Supplementary Estimates in Parliament on March 9, Mr. Churchill scored a great victory by his able exposition of the manner in which the work of the country is being done by the R.A.F. much more cheaply and more expeditiously than it could possibly be done by the Army. He stated that there are now eight squadrons concentrated in a loop of the river at Baghdad, and that this represents a third of the whole strength of the R.A.F. This more than justifies the carrying out of the original intention of placing the military control of Iraq under the charge of the officer commanding the R.A.F., and the announcement to that effect will be received with the greatest satisfaction by all who believe in the future of the Air Force. As the R.A.F. will be by far the largest force in the country, it is only right, as Mr. Churchill said, that the command should follow the bulk of the forces there. We have no fear of the further outcome of this interesting experiment, and believe it to be the forerunner of many such undertakings in various parts of the Empire.

As Maj.-Gen. Seely stated during the debate, it is a red-letter day, because, for the first time in history, we see the young Air Force taking charge of a big country, with the older services ancillary to it, and we congratulate the Colonial Secretary on his being able thus early to complete his scheme by utilising the R.A.F. in this manner. As we have already said, we look upon the decision as the first step in the realisation of the enormous future which lies before the R.A.F. At the same time we quite agree with Gen. Seely that this departure will not be allowed to pass without the most formidable attacks by what he called the "old-fashioned people."

It is interesting to refer, in this connection, to some remarks made during the discussion of Air-Commodore Brooke-Popham's paper before the Central Asian

Society by Maj.-Gen. Sir Frederick Maurice, printed elsewhere in this issue. In his career Sir Frederick has had ample opportunity of getting experience of the War Office and of the old-fashioned military mind, and he stated as his firm conviction that, had the R.A.F. been under the control of the War Office it would never have been allowed to prove of what it is capable in the manner in which it has been allowed to do so under independent control. He expressed the view that under no circumstances must we allow the R.A.F., which is as yet in a stage of evolution, to be hampered and probably killed by being made subservient to the older Services. As we have repeatedly pointed out in these columns, forces are constantly at work attempting to undermine the R.A.F. and the Air Ministry as a separate service and ministry, and we must never relent our vigilance if these forces are to be kept in check and the R.A.F. allowed to develop untrammelled towards its ultimate destiny of being our principal fighting force and our first line of defence. And that is precisely why we are pleased with the matured steps announced by Mr. Churchill. So long as we have men with the courage of their opinions like the Colonial Secretary, who possesses the necessary imagination to take a broad view, and so long as the R.A.F. remains loyal to its chief and does its best to deserve the trust thus placed in it, we need have no fear for the future. The ultimate victory of the new air arm over the older Services is certain.

#### The Loth Guide Cable

If there is any one item which, more than any other, affects the utility and safety of aircraft it is the capacity to fly in the dark and in fog. Over very long routes, such as for instance England to Australia, the capability to fly at night as well as in the daytime is practically equivalent to doubling the speed of an aeroplane. It is not, of course, quite so, as there must be delays in transferring passengers and/or mails from one machine to another, but for practical purposes the speed is very nearly doubled. To do so by any other means would be out of the question. Or, looking at the matter from another point of view, to be able to fly by night is the means of drawing full advantage of the speed of the aeroplane, when otherwise this could not be done. On the long routes it is of little use to be able to do 100 m.p.h. for 12 hours, and then having to stop for another 12 hours. The practical speed is then only 50 m.p.h. But by flying at night an *average* speed of, say, 70 or 80 m.p.h. could be maintained, which would be so vastly ahead of any other means of locomotion as to give aircraft an enormous advantage. Any means which can be taken for rendering safe flying by night and in fogs is therefore entitled to serious consideration.

In this connection, the Loth guide cable described elsewhere in this issue is of more than ordinary interest, and appears to promise great things for the future. Already the French Government has decided to equip le Bourget with such a cable, and there is more than a possibility that the cable will be extended from le Bourget to the French coast, as a first step towards introducing this means of guiding aircraft over the French portion of the London-Paris route. It now remains to be seen whether our Government is ready to co-operate by

similarly equipping our modest 60 miles or so of route between Croydon and the English coast.

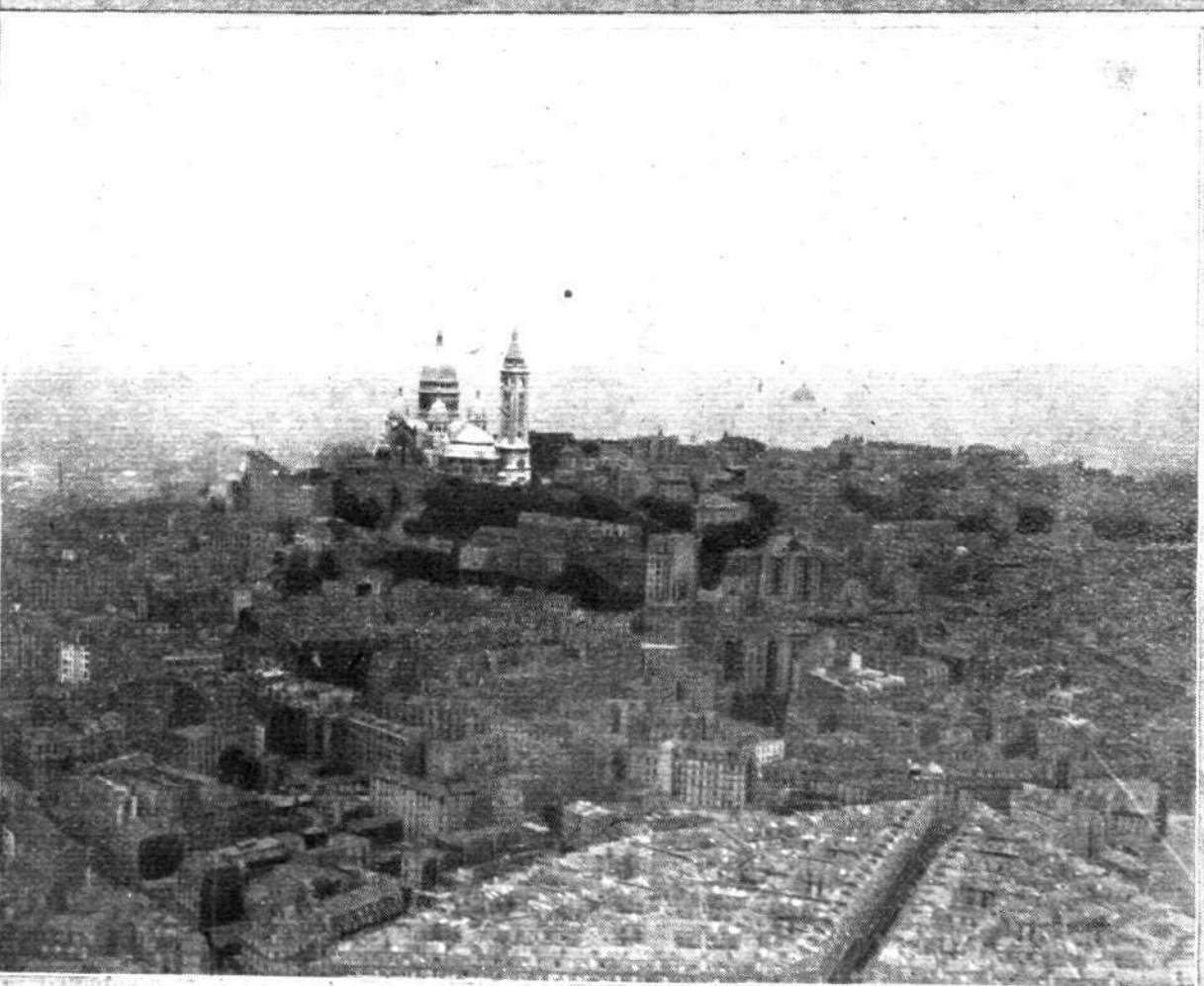
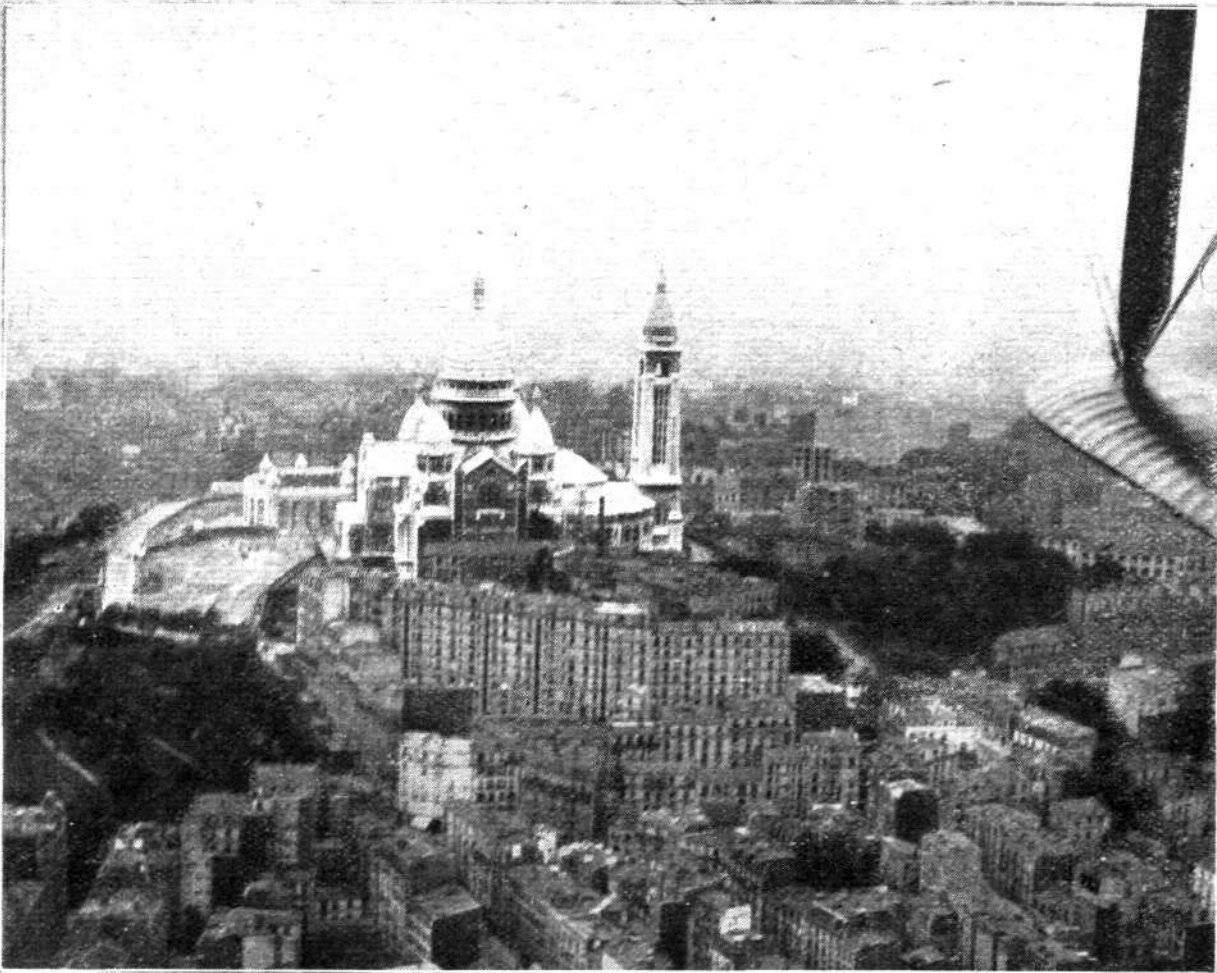
#### American Research on Thick Aerofoils

According to the American National advisory Committee Report for 1921 (Administrative Report without Technical Reports), a large number of tests on thick aerofoils have been carried out, with the object of studying the properties of aerofoils suitable for internal bracing. The Report states that the tests were made at air speeds of 35 metres (115 ft.) per second, and in some cases at a speed as high as 60 metres (197 ft.) per second. Several very interesting facts were brought to light. For instance, it was found that thick wings improve in efficiency with speed more rapidly than thin wings. In other words, the scale effect was considerable, and thick wings, when applied to modern high-speed aeroplanes, may be expected to have a better L/D ratio than would be indicated by model tests at relatively low speeds. It appears from the Report that an efficient thick wing was sought, rather than one having a high maximum lift coefficient. Thus it is stated that some of the sections developed had at all angles a higher efficiency than the R.A.F. 15 section tested under the same conditions, and yet were more than three times as thick as that section in the centre. The maximum lift coefficients were approximately the same.

The Report does not contain any figures relating to these tests, but no doubt the technical reports dealing with the experiments will be published in due course. We are looking forward to seeing them, as the reference to them appears to indicate a very great improvement. Thus, while having a wing as efficient as the R.A.F. 15, a much lighter wing would result from the greater depth of wing spars; or, if an internally braced cantilever wing is required, the section should be deep enough to allow of building such a wing without undue wing weight. Hitherto it has been customary in certain quarters to dismiss the thick wing as being hopelessly inferior, as regards efficiency, to the thin wing. This report indicates that the thick wing may have been sadly misjudged on its model figures, and no doubt the new wind tunnels which are being constructed in America will be used for determining the scale effect on such wings at speeds giving a truer indication of the properties of the actual full-size wings.

In this connection it is also of interest to note that experiments on several heavily-tapered wings indicated that wings of this type had the same centre of pressure travel and practically the same efficiency as wings of uniform section. This is all in favour of the cantilever wing, since for structural reasons it is an advantage to taper the wing from root to tip so as to get the greatest stresses where the section is of greatest depth and where, consequently, the spars are better able to resist the bending moments imposed upon them. Another advantage of the tapered wing is that it usually tends to make an aeroplane very nice to handle as regards lateral control, the machine responding readily, even to fairly small ailerons, as instanced by several German types having tapered wings. As soon as the technical reports on these tests become available we hope to place them before our readers.





**LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE:**  
No. 29.—In Paris. *Top: Sacre Cœur. Below: General View of Montmartre.*

Copyright, Handley Page, Ltd.

## THE HUFF-DALAND BIPLANE

HUFF, Daland and Co., of Ogdensburg, N.Y., have recently produced two interesting machines incorporating thick-section wings and several novel constructional features. These two machines are known as the H.D.9A two-seater Army training biplane, and the H.D.8A "Petrel" three-seater commercial biplane. The former was brought out to meet the United States army requirements of a Type 14 air-cooled-engine training plane, and was fitted with a 100 h.p. Anzani engine, whilst the latter is a further development of this machine incorporating the Curtiss O.X.5 water-cooled engine. It was produced to meet the demand for a strong, moderate-powered three-seater of simple construction, capable of being operated and maintained at the lowest possible figure.

Except for the changes necessitated by the change of engine and a slightly more streamlined fuselage in the H.D.8A,



The Huff-Daland H.D.9A Biplane : Three-quarter front view of the 100 h.p. Anzani model.

both of these machines follow the same general type of construction, and the following description more or less applies to both.

It is in the fuselage that the most interesting feature of the H.D. machines is to be found. A somewhat unusual, but at the same time exceedingly simple, method of construction has been employed on all the H.D. models—a form of construction differing from the orthodox braced girder type, as may be seen on referring to the accompanying illustrations. It will be seen that the upper and lower longerons in this case form a triangulated truss between the main planes and the tail, the apex being at the latter—very much after the fashion

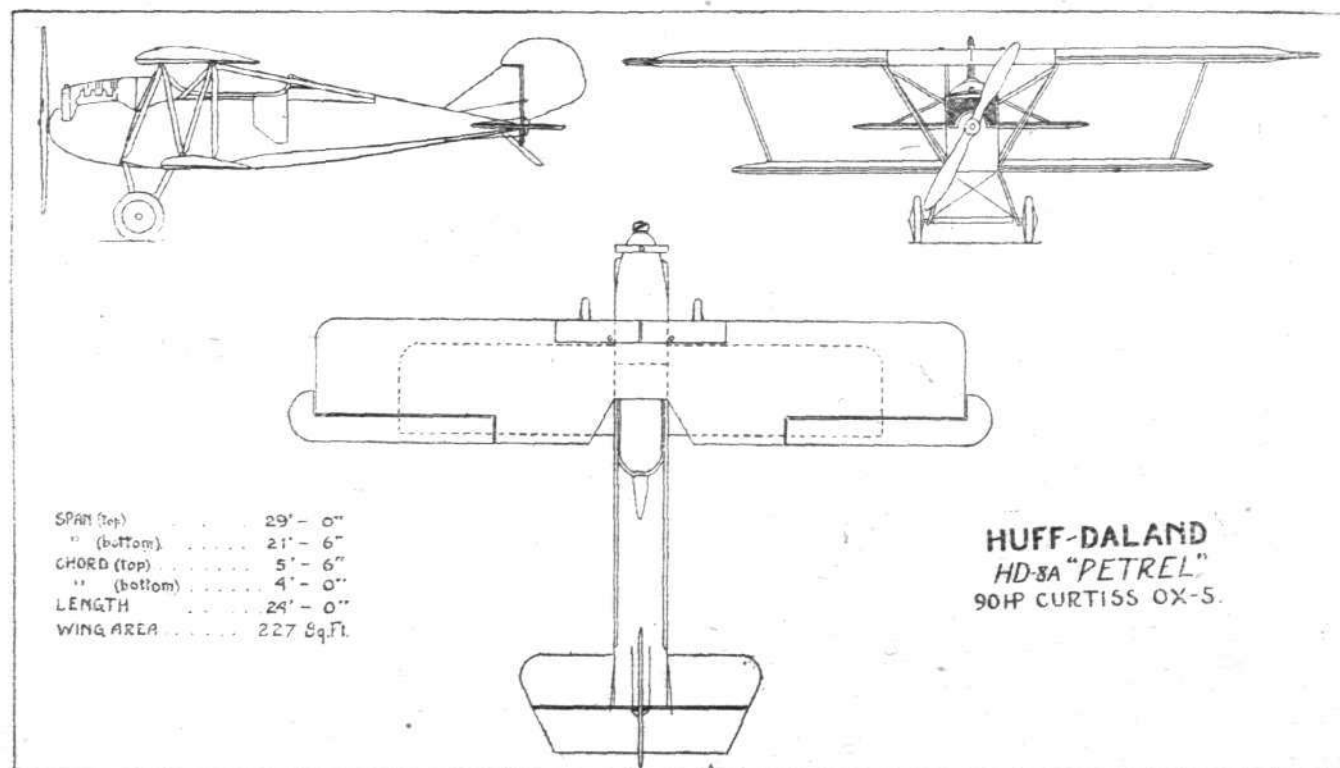
of the outrigger tail booms of the "box-kite" biplane. Each upper member, or longeron, runs from the rear spar of the top plane, where it is connected with the corresponding lower member by two struts, meeting the latter at the location of the lower plane rear spar and the foremost extremity—at engine partition—respectively. Other vertical struts connect the upper and lower members at the end of the cockpit, at the tail (leading edge) and midway between these points. Auxiliary longerons extend rearwards from the top of the transverse engine bulkhead and form the pilot's and passengers' cockpit. Aft of the latter the auxiliary longerons are decked over by means of stringers, whilst a curved bottom is similarly formed on the lower members.

By this form of construction tail loads and wing loads are carried by direct paths through these rigid members in place of the usual struts and wires. It also greatly reduces the number and weight of parts, whilst the time taken in assembly is likewise reduced. The only wire cross-bracing is between the lower longerons, and these wires are threaded on the ends and carried through holes in the longerons at the strut junctions to a small steel plate and nipple. The use of a large number of turnbuckles is thus obviated.

Veneer is used for covering the fuselage from the engine plate to a point aft of the cockpit, and access to the latter is by means of side doors which in no way weakens the fuselage structure. The rest of the fuselage is fabric-covered.

The mounting of the 10-cylinder Anzani engine follows that employed on the earlier training model turned out by this firm—the H.D.4. It consists of a circular nose-piece to which the engine is bolted, supported by a system of tubular trussing connected to the forward bulkhead at the longeron junctions. Four large pins connect the unions of these tubes at their attachment to the fuselage, making the removal of the engine unit an easy matter, and allowing the engine to be swung backward for inspection by withdrawing two pins on one side or the other.

In the case of the Curtiss O.X. 5, in the H.D.8A, the mounting is as follows:—The fuselage terminates with a solid bulkhead and fire-shield, upon which six large pin fittings are mounted. The tubular engine mounting itself, made up in two halves, right and left, is bolted to these fittings without the need of any cross wires or external bracing for support. It may be detached with the engine as a unit in case of quick changes on the aerodrome, while in the shop the engine can be slipped into place along the bearers without having to disturb



THE HUFF-DALAND H.D.8A BIPLANE : General arrangement drawings.



any of the accessory fittings. The cowling is hinged aft of the engine top and bottom, so that it may be raised or lowered entirely out of the way and yet not require complete removal. The wing section employed in both machines is the Göttingen 387. Both upper and lower wings are built upon veneer-sided box spars. The veneer sides terminate at points about one-fifth of the span from the wing tips, the remaining portion of the spar being formed by a Warren truss supporting the upper and lower members of the spar. The ribs are of

balanced, washed-out type. They are carried upon false spars, and are identical in area and arrangement with Fokker D-VII design. The leading edge consists of a large steel tube, and the trailing edge a much smaller gauge tubing; they are connected by short triangular ribs of steel tubing. The *ailerons* are actuated by a push-and-pull rod extending within the wing, and connected by a bell crank and tube to the horn on the *aileron* tube. Movement of this push-and-pull rod is obtained by the use of two cables running over four

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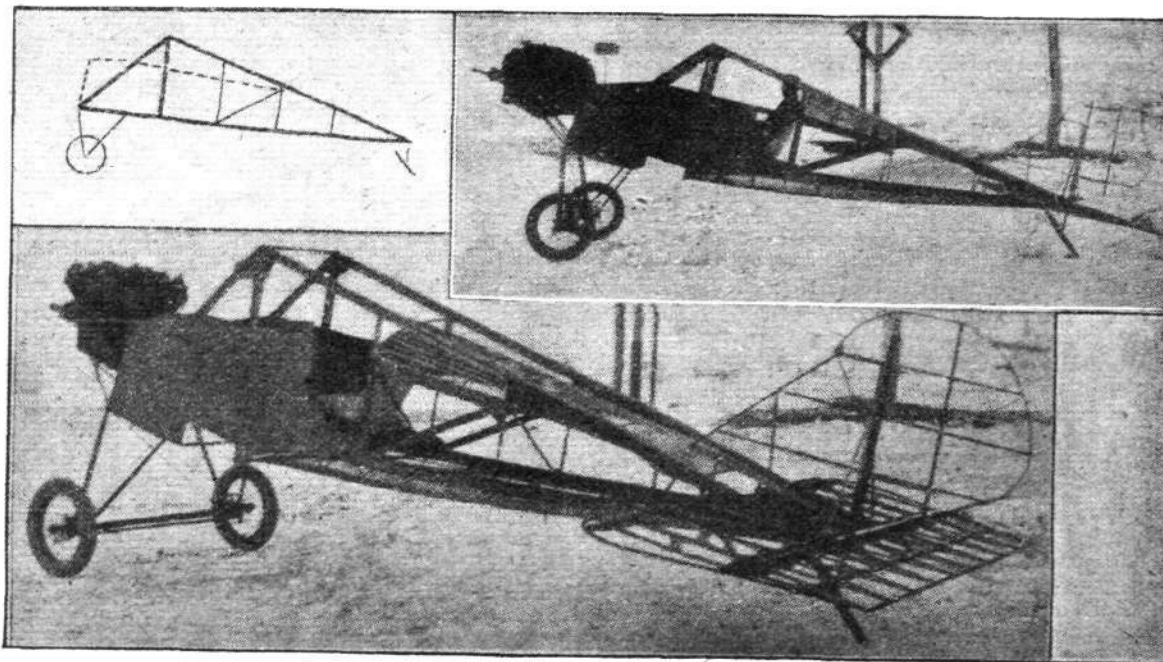
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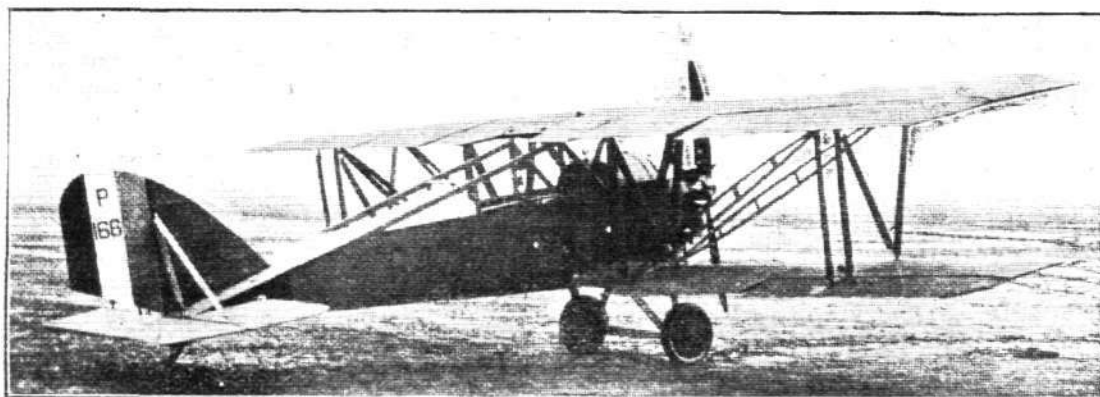
**The Huff-Daland H.D.8A Biplane:**  
 Two views showing the novel fuselage construction.



special construction and novel design. Owing to the great wing-depth two independent girders of basswood are used to form the top and bottom flanges, fastened together by suitably spaced vertical members. The fabric is sewed separately about the upper and lower parts, giving added security by forming an independent attachment for both surfaces. Sand tests have been carried out on these ribs beyond the required f.s. of 8 without sign of failure. The entering edge is of veneer.

pulleys and fastened to it directly over the cockpit. By removing two connections, readily accessible through holes in the lower surface, the upper wing may be removed with its controls complete.

The tail surfaces consist of an adjustable horizontal stabiliser, a one-piece unbalanced elevator hinged to the trailing edge of the stabiliser, and a vertical fin and balanced rudder braced by two adjustable tubes. Aluminium sheathing is provided to prevent leakage at the union of the stabiliser



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**The Huff-Daland H.D.4B Biplane:**  
 Another type, the forerunner of the H.D.8A and H.D.9A, used for training purposes.

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A double set of drift wires, which independently truss the upper and lower members of the spars, give unusual rigidity. The top plane is supported with a rigid connection between the rear spar and the apex of the fuselage longeron, and three additional struts on each side. These are located as in the Fokker D-VII biplanes, one extending from the lower fuselage longeron at junction with lower rear wing spar to the upper rear wing spar at the end of the centre section; a second strut extends from the forward extremity of the lower longeron—at junction with front chassis strut—to the front top wing spar, corresponding to the rear spar attachment. The third strut runs from the top of the second to the forward extremity of the auxiliary fuselage longeron. These struts, as well as the "N" interplane struts, are of streamline steel tubing, the "N" struts being adjustable for the correction of incidence. The lower wing fits into a recess formed in the fuselage bottom, and is secured by four large bolts—a system also similar to that employed on the Fokker D-VII.

*Ailerons* are fitted to the top plane only, and are of the

and the elevator. Conventional controls are used for the rudder and elevator.

The usual V-type landing gear is fitted, constructed of steel tubing, but the method of securing the shock-absorber cords is somewhat unusual. These are wrapped on separate spindles and fitted as units, providing an easy means of replacement.

An extremely simple petrol system is employed on these machines, consisting of two 11-gal. tanks located in the middle of the top plane, each connected by a  $\frac{3}{4}$ -in. steel tube carrying in its centre a sight gauge, giving a positive record at all times to the pilot. Petrol flows by gravity directly from the tank to the carburettor, using the hollow flying struts as a medium—outlets being welded at the upper and lower ends for hose connections. In a similar way a large hand pump, accessible from the cockpit, is connected through another strut to the tanks, and thus provides an easy and quick means for filling the tanks.

During flight tests with these machines the characteristic

high-lift qualities of the thick wing sections at high angles of incidence were demonstrated to a marked degree. It is stated that the H.D.8A, arranged as a dual-control two-seater, has been accepted by the United States Army for training purposes.

The general specifications of the H.D.8A for commercial work are given below, and these, with one or two exceptions, also apply to the H.D.9A:—

Span—upper .. .. .	29 ft.
Span—lower .. .. .	21 ft. 6 ins.
Length over all .. .. .	24 ft.
Height over all .. .. .	9 ft.
Chord—upper .. .. .	5 ft. 6 ins.
Chord—lower .. .. .	4 ft.
Stagger .. .. .	10½ ins.
Gap (mean) .. .. .	4 ft. 6 ins.
Incidence (upper and lower) .. .. .	0°

Wing section .. .. .	Göttingen 387.
Total wing area .. .. .	227 sq. ft.
Rudder area .. .. .	8½ sq. ft.
Fin area .. .. .	7½ sq. ft.
Stabiliser area .. .. .	20½ sq. ft.
Elevator area .. .. .	19½ sq. ft.
Aileron area .. .. .	11½ sq. ft.
Weight light (with water) .. .. .	1,120 lbs.
Useful load .. .. .	660 lbs.
Passengers (two) and pilot .. .. .	510 lbs.
Petrol and oil .. .. .	150 lbs.
Loading per square foot .. .. .	7.9 lbs.
Loading per horse-power .. .. .	19.8 lbs.
Endurance (full throttle) .. .. .	2½ hrs.
Speed range .. .. .	85–31 m.p.h.
Climb (at sea level) .. .. .	370 ft. per min.
Absolute ceiling .. .. .	10,100 ft.

## NOTICES TO AIRMEN

### Italy : Regulations Governing Flight

The following are extracts from regulations governing flight over Italian territory, issued by the Italian Ministry of War under date November 19, 1921:—

(1) *Aerodrome Control.*—(a) Acrobatic landings are prohibited at every aerodrome throughout the realm. (Article 22.)

(b) *Direction of Landing.*—In every aerodrome the normal line of landing and "taking off" shall be clearly indicated on the ground by a T, the dimensions of which shall conform to those shown in Fig. 1. The long arm of the T indicates the direction of landing, and the short arm indicates the proper position for the under-carriage wheels to touch ground. In every aerodrome there shall not be more than one T, which shall be oriented in the most natural direction of landing, taking into account the direction of the prevailing wind. (Article 27.)

The direction of landing indicated by the T shall be obligatory for all aircraft. (Article 28.)

If an aeroplane, owing to the necessity of landing up wind, be obliged to land in a direction different from that indicated by the T, and if the dimensions of the aerodrome permit,

or the vicinity of persons or dwellings may in any way endanger the public safety.

(e) To carry out any flight at an altitude of less than 1,000 metres (3,280 ft.) above any aerodrome or place in which a public meeting is being held. This rule may be waived only in the case of meetings of a sporting nature when a special written authorisation has been received from the competent aeronautical authorities and from the competent political authorities having jurisdiction over the area within which the meeting is to be held. Such authorisation will only be granted where all the circumstances relating to the event and to the locality are such as to guarantee public safety. (Article 36.)

(No. 23 of 1922.)

### Wireless Navigational Warnings to Airmen

1. Information of a specially urgent nature concerning aerial navigation, e.g., warning regarding the discontinuation of navigational aids or obstruction of landing areas at aerodromes, will in future be broadcasted by wireless telegraphy from Air Ministry W/T Station, in addition to being promulgated in the usual manner.

2. Such notices issued by wireless will be added at the end of the Air Ministry synoptic weather reports transmitted on a wave length of 1,400 metres C.W. at any of the following times:—

0600 G.M.T., 0800 G.M.T., 1400 G.M.T., 1900 G.M.T. (No. 25 of 1922.)

### NOTICES TO GROUND ENGINEERS

#### Avro 504K Type Aircraft : Gravity Tanks

1. The gravity tank on the top centre section is to be considered a standard fitting on Avro 504K aircraft.

2. No Certificate of Airworthiness in respect of this type of aircraft will be issued unless a gravity tank is fitted.

3. No renewal of an existing Certificate of Airworthiness in respect of this type of aircraft will be granted unless a gravity tank is fitted.

4. These gravity tanks are obtainable from Messrs. A. V. Roe and Co., Ltd. (No. 2 of 1922.)

#### "Petroflex" Tubing and Jointing

The following precautions should be observed when using "Petroflex" tubing:—

1. The ends of piping or connections to be joined by means of "Petroflex" should be parallel, with sharp edges removed.

2. Pipes should enter the short lengths of "Petroflex" up to the first corrugation, but no further.

3. On no account must the lining of the tubing be stretched or contracted by attempting to fit it to connections of a size other than that for which it was manufactured.

4. Ends of "Petroflex" joints should be slightly bell-mouthed (to the extent of approximately ¼ in.) in order to prevent the lining from being forced back or injured when assembling.

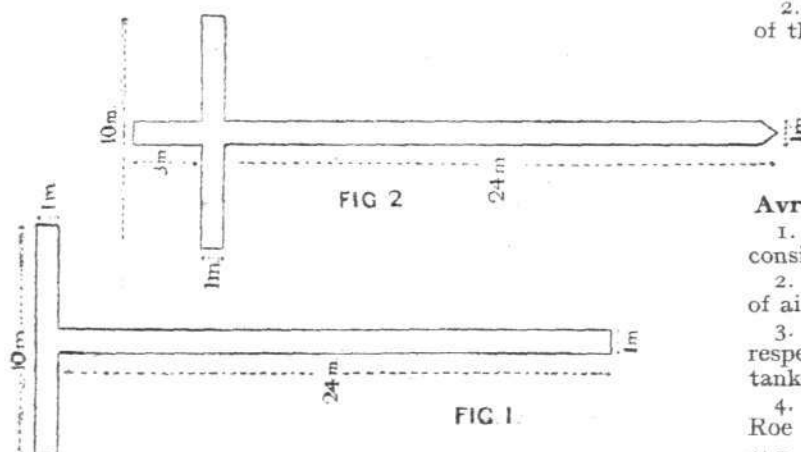
5. Care should be taken not to twist or disarrange the tubing during assembly.

6. Gold size may be applied to the connections before fitting the tubing. This facilitates assembly and makes a good joint. On no account should soft soap or oil be used as a lubricant for this purpose.

7. Tubing must be securely fixed by means of approved hose clips.

8. "Petroflex" must not be used in either water or lubricating oil systems.

9. "Petroflex" tubing should be stored in a dry place. (No. 3 of 1922.)



the signal to the aircraft in flight shall be given by placing in the new landing direction white ground strips in the form of a Roman dagger, as shown in Fig. 2. It shall be obligatory to display this signal only at aerodromes having no proper semaphore service. (Article 29.)

(c) *Marking of Obstructions.*—All fixed obstructions dangerous to flying (such as towers, chimneys, W/T aerials, etc.) within a zone of 500 metres around all aerodromes shall be indicated by three lights, one white, one red and one green. (Article 35.)

*Note.*—Pending information that the system of markings described above has been definitely established, pilots landing on Italian aerodromes should not assume without investigation that marks are laid down in accordance with this system.

(2) *Height of Flight; Aerobatics, etc.*

It is strictly prohibited:—

(a) To engage in aerial acrobatics of any kind whatsoever at an altitude of less than 1,000 metres (3,280 ft.) above the aerodrome.

(b) To engage in aerial acrobatics above inhabited areas.

(c) To fly over inhabited areas at a height of less than 1,000 metres (3,280 ft.) in the case of flying machines and of less than 200 metres (660 ft.) in the case of free balloons and airships.

(d) To carry out any flight which on account of low altitude



# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

## COUPE HENRY DEUTSCH DE LA MEURTHE

(International Contest)

(Under the Regulations of the *Fédération Aéronautique Internationale* and the C.S.A.)

### GENERAL REGULATIONS

LAST week we were able to refer briefly to the new rules for the Coupe Deutsch de la Meurthe. We have now received the complete regulations as drawn up by the *Commission d'Aviation* of the *Aero Club de France*.

#### Origin of the Cup

Art. 1. Mme. Henry Deutsch de la Meurthe and her family have decided to offer, in memory of M. Henry Deutsch de la Meurthe, a sum of 200,000 francs for an international speed contest to be called the Coupe Henry Deutsch de la Meurthe.

The Cup will be contested under the conditions laid down in the present regulations, which have been drawn up at the request of the donors, and with their approval, by the *Commission d'Aviation* of the *Aero Club de France*. The *Commission d'Aviation* is responsible for the organisation of the Contest.

#### Prizes

Art. 2. The sum of 200,000 francs will be distributed as follows:—(a) An objet d'art of 20,000 francs. (b) Three prizes of 60,000 francs each to be awarded to the winners of the Cup, in accordance with the present regulations.

#### General Conditions

Art. 3. The Contest will be an international challenge open to all machines of Class "C" (flying machine with engine). It will consist of a speed test over a distance of about 300 kms. Each year before May 1, the *Commission d'Aviation* of the *Aero Club de France*, taking into account the progress in Aviation, shall publish the special regulations for that year.

#### Qualification of Competitors—Pilots

Art. 4. Every qualified National Federation shall signify to the *Aero Club de France* its willingness to contest the Cup. This notification must reach the Secretary of the *Commission d'Aviation* of the said Club before the date fixed by the special regulations for the year. This entry must be accompanied by a sum of 1,000 francs for each machine, 500 francs being returned in respect of each machine crossing the starting line in flight.

The entrants of each nation shall be the constructors of the machines, and shall not be approved unless presented by a National Federation affiliated to the *Fédération Aéronautique Internationale*. Each National Federation shall not present more than three entrants (i.e., 3 machines in all).

The entrants and pilots in charge of the machines must be of the same nationality as the Federation presenting them or belong to a country not represented on the *Fédération Aéronautique Internationale*, the countries that were at war with France from 1914 to 1918 being excepted, unless they are members of the League of Nations.

#### Date and Place of Contest

Art. 5. The Cup will be contested each year on a date and at a place fixed by the Special Regulations for the year.

#### Award of the Cup.—Provisional Holder and Permanent Holder

Art. 6. The National Federation recognised by the *Fédération Aéronautique Internationale* whose representative has won the Cup, shall be the Provisional Holder until the following award has been made. The objet d'art shall remain in the hands of the *Aero Club de France* until the final award has been made.

The Permanent Holder of the Cup shall be the Competitor who has twice won the Contest, or, failing that, the third

winner. In the event of the first two contests being won by the same competitor, this competitor, having become the Permanent Holder of the Cup, shall at the same time receive the remaining two prizes of 60,000 francs.

Art. 7. Entrants are responsible for all accidents to themselves and their personnel, as well as for damages of any kind to third parties, officials, etc., caused by their machines, pilots, workmen or themselves.

Art. 8. To satisfy administrative and customs requirements, competitors must send to the *Commission d'Aviation de l'Aero Club de France*, on a date to be fixed by the annual regulations, the following information (failure to do so may prevent the competitor taking part in the Contest):—

1. Value of each machine. 2. Name and address of the pilot of the machine, also name and address of the substitute, it being permissible to change the first pilot if necessary.
3. Name or number of machine. 4. Type of machine and motor. 5. Weight and material of wings. 6. Weight of motor. 7. Weight of propellers. 8. Country of origin.

#### Supplementary Regulations for 1922

Art. 1. The Contest will take place over 300 kilometres in the circuit Villesauvage—La Marmogne (the course of the Gordon Bennett Cup, 1920). Alightings, repairs and replenishments are allowed.

Art. 2. The Contest will take place on Saturday, September 30, 1922.

Art. 3. Entries presented by the National Federations must reach the *Commission d'Aviation de l'Aero Club de France* before 6 p.m., on Saturday, August 19, 1922.

Art. 4. Machines must be on the Aerodrome at Villesauvage before 4 p.m. on the day before the Contest, viz., September 29, 1922.

Art. 5. Competitors must send to the Secretary of the *Commission d'Aviation* before 6 p.m. on August 19, 1922, the information required in Art. 8 of the General Regulations.

Art. 6. Each entrant must nominate, by a declaration in writing to be handed to the *Commissaires Sportifs* before 6 p.m. on the day before the Contest, a person to represent him on the Course. This person shall declare the time of departure.

Art. 7. The Contest shall be open from 9 a.m. to 6 p.m. During this period of 9 hours, starts shall be made at times chosen by the competitors, as follows:—

Each entrant, or the person accredited by him, shall inform the *Commissaires Sportifs* of his intention of starting, indicating the time at which he wishes to start. The *Commissaires Sportifs* shall then hand to him a slip fixing the time of starting, after which 30 minutes will be allowed to the competitor to cross the starting line in flight.

If after the expiration of this time the competitor has not crossed the starting line in flight, he will be obliged to make a second and final request to start, and the same procedure will be followed as for the first request, except that at the expiration of the second 30 minutes the competitor will be considered to have started.

Art. 8. The Cup will not be awarded if the speed attained is less than 280 kms. per hour.

Art. 9. In the event of bad weather on the day of the Contest the *Commissaires Sportifs* may postpone the contest from time to time.

All communications regarding this Contest should be addressed to the Secretary, Royal Aero Club, 3, Clifford Street, London, W. 1.

#### Previous Winner

1921. FRANCE.—*Georges Kirsch*, Villesauvage, October 1, 1921. Nieuport-Delage. 300 h.p. Hispano-Suiza. Distance 300 kms. Time, 1 h. 11 m. 39½ s.

not less than 100 m.p.h. Distance approximately 32 miles, Prizes, £30.

*Second Croydon Handicap*.—For machines with a speed of less than 100 m.p.h. Distance, approximately 24 miles. Prizes, £30.

*First Spring Handicap*.—For machines occupying the first three places in the Waddon and Croydon Handicaps. Distance, approximately 32 miles. Prizes, £60.

*Double Parachute Descent*.—By Sergeant W. Newell in a "Guardian Angel" parachute.

*Balloon Sniping Competition*.

#### EASTER AVIATION MEETING

THE Royal Aero Club will hold an Aviation Race Meeting at Waddon Aerodrome, Croydon, on Easter Monday, April 17, 1922, starting at 3 p.m.

Members of the Club will be admitted free on presentation of their membership cards. Motor cars, 5s.

#### Programme

*Club Handicap*.—For machines Avro type. Distance approximately 16 miles. Prizes £30.

*Second Waddon Handicap*.—For machines with a speed of

The Aircraft Disposal Co., Ltd., have certain machines available for the Races, and they will be prepared to consider applications for the hire of these from qualified pilots. Applications should be made direct to the Company at Waddon Aerodrome, Croydon.

The following Club machines will also be available:—

- B.E.2E (2-seater), 90 h.p., R.A.F.
- Avro (2-seater), 110 h.p. Le Rhone.
- Avro (2-seater), 110 h.p. Le Rhone.
- Avro (2-seater), 110 h.p. Le Rhone.

Qualified pilots wishing to take part in the Races may hire any of these machines from the Club at £3 for each event,

which will include cost of petrol, oil and insurance of machine. Applications for these machines should be made direct to the Club.

The Races will be over a circuit, the machines remaining in sight of the spectators at the Aerodrome all the time.

Entries close on Friday, April 7, 1922, at 5 p.m. Entry fee, £1 for each event.

Further particulars of the Races may be obtained from the Club.

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

## LONDON TERMINAL AERODROME

Monday Evening, March 13.

THE air station becomes gayer and more brightly painted day by day. If paint were any criterion of the success of commercial aviation, it would appear that the air-lines are in a very flourishing condition. The Grands Express have nearly completed their new passengers' waiting-room, and are painting it in the firm's particular shade of light blue. The Instone Line's passenger waiting-room is an ambitious affair, with writing-tables, comfortable armchairs, and a settee.

It would almost appear as though the various air-lines expect their passengers to do a lot of waiting. Yet any such attitude would be very hard to justify. Surely it might be better if, instead of expending time, money and space on the provision of these waiting-rooms, the air-lines were to arrange their car and aeroplane services so that no waiting is necessary. Considering the amount of time already spent on the journey between terminal aerodromes and cities there should be no waiting whatever on the 'drome.

For the past week, workmen have been busy digging a huge hole on the edge of the aerodrome, near the new hangars, and this morning a giant petrol-tank arrived ready to be buried therein. Pipe-lines are to be run out to the new hangars, so that machines can be filled with petrol without having to wait their turn near the departure-platform.

### The Housing of the "Air Expresses"

THE Daimler Airway are erecting a dynamometer for testing their engines, and have already put down the concrete base next the hangar nearest the departure-platform. This company are to have the top hangar, Handley Page Transport and the Instone Air Line the next two; while the fourth is, I understand, to be occupied by the K.L.M.

The K.L.M. "F.2," which arrived from Holland a fortnight ago, and has been held up for repairs to the engine, left for Amsterdam this morning. Mr. R. E. Duke, who is joining the Daimler Airways, has been retained by the K.L.M. to pilot this machine to Amsterdam. He had with him, in the seat beside the pilot, Mr. Van Der Hoop, a Dutch pilot, who is getting used to the London-Amsterdam route, and will probably be seen on the service this summer. Mr. Leverton, who had business in Amsterdam, travelled as passenger in the machine, and was anticipating a very rough trip, as the wind was blowing almost a gale from the east, and the journey was expected to take between four and five hours.

In connection with the activities of the Fokker firm, which are apparently on the increase, Mr. Van Der Waal, the manager of the Fokker works, has been in London buying aero-engines. I understand that he bought Napier "Lions" for the "E.4," and Rolls-Royce "Eagles" for a new machine,

the "F.5," which is an intermediate size between the "F.2" and "F.4."

The Instone Air Line are considerably worried by the engineers' labour trouble. They are afraid that it will hold up the new machines which Vickers are building for them, and also the repairs which are being made to some of the old "flying stock."

The great gale on Wednesday last completed the work of bringing down two of the disreputable old hangars which have been an eyesore in front of the Disposal Company's sheds since the aerodrome opened. Luckily, there were only a few old machines, of no commercial value, in the hangars at the time they were blown down.

A number of machines of various types have been out on test for the Disposal Company, during the week, and Mr. Piercy brought back a machine—originally destined for Spain—which had been damaged while landing at Paris.

### Forced Landing and Damage of a "Goliath"

ONE of the Grands Express Goliaths was "written off" by a forced landing on Saturday at Farnborough, Kent. The pilot and three passengers escaped injury. The passengers were, in fact, rather intrigued by their experience; but the machine had its under-carriage and fuselage very badly damaged. M. Chalambel, the pilot, had been forced to descend owing to a mist which was thickening as he approached Croydon.

M. Didier informs me that he expects the first of the Messageries' Renault-engined "Goliaths" at Croydon on Wednesday. In the meantime, the Messageries' service is still carrying on with the five-seater Spads and an occasional Breguet.

Mr. Olley, of Handley Page Transport, had a strange experience during the week. While getting-off from Le Bourget, he apparently caught one of the obstruction posts, and when he arrived at Croydon this post was found wedged in his under-carriage. It pierced the bottom plane, in fact, as he was landing. Yet he was quite unconscious of having struck anything, and was astonished to find the post in his under-carriage when he descended from the machine.

Mr. Havelock Wilson, of the Sailors' and Firemen's Union, went by Handley Page to Paris to attend a conference during the week. On his return journey there was a stiff wind, and the machine took between six and seven hours on the flight. Owing to the length of the trip, a descent was made at Lympe to fill up with petrol, and in order that there should be the least possible delay, a wireless message was sent by the pilot when in mid-Channel asking for so many gallons of petrol. When Mr. Wilcockson brought the machine down at Lympe the petrol was ready waiting to be poured into the tanks.

### British Empire League

THE DUKE OF DEVONSHIRE presided over a meeting of the Council of the British Empire League on March 7, at the House of Lords. Among those also present were: Lord Aberdeen, Lord Blyth, Lord Buxton, Lord Foley, Lord St. John, Lord Sydenham, Mr. A. H. Ashbolt (Agent-General for Tasmania), Sir Ion Hamilton Bann, M.P., Sir Edward Beauchamp, M.P., Sir John Cockburn, Sir J. D. Connolly (Agent-General for Western Australia), W. Herbert Daw, Admiral Sir E. R. Fremantle, Mr. Lewis Haslam, M.P., Sir J. Norton-Griffiths, M.P., Sir J. Hood, M.P., Colonel Culver James, Sir John Randles, M.P., Mr. Gershom Stewart, M.P. and Mr. C. Freeman Murray (Secretary).

On the motion of Sir J. Norton-Griffiths, M.P., seconded by Mr. A. H. Ashbolt (Agent-General for Tasmania), the following resolution was unanimously adopted:—

"The Council of the British Empire League considers that the establishment of an Imperial Air Service by means of airships working from Great Britain to Egypt, India,

Australia, New Zealand and South Africa, would be of the greatest importance in the interests of the Empire, and urges upon His Majesty's Government the necessity of providing such financial guarantees as are required for the preliminary measures, in order that such Airship Service may be established as soon as possible, on a commercial basis.

"The Council further considers that nothing should be done to break up the existing ships, plant and personnel before June 1, as undertaken by Capt. The Right Hon. F. E. Guest, M.P., Secretary of State for Air, at the recent Air Conference in the Guildhall."

The resignation of Lord Sydenham as Chairman of Executive was received with much regret, and Lord Southborough was unanimously elected as his successor to that office.

### Wireless Telephones for Channel Machines.

It looks as if it will be possible shortly for passengers on the London-Paris machines to speak by wireless 'phone to offices in either city while in the air. The necessary arrangements are, we understand, nearing completion.



# THE LOTH GUIDE CABLE

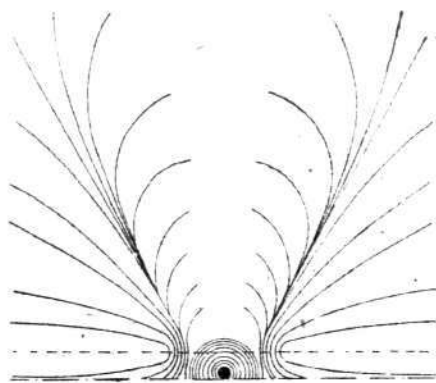
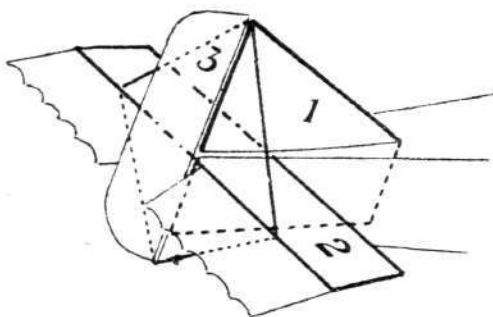
## An Interesting French Aid to Air Navigation

ALTHOUGH there were relatively few things upon which members of the recent Air Conference agreed, it was inevitable that in all that mass of problems there should be some upon which every one was agreed. Among these was the desirability of being able to fly by night and in fogs. Virtually the ability to do this amounts to doubling the speed of any given aeroplane—at any rate, over long distances. Even for such short routes as the London-Paris, it was pointed out by several, notably by Gen. Williamson of the G.P.O., that a night air mail service would be valuable and would save a great deal of time. In addition to the advantages of being able to save time by flying at night, the question of reliability and regularity of service is closely bound up with the capability of flying in fog or clouds. With modern instruments the problem of flying in clouds is perhaps less serious than that of carrying on during foggy weather. Nevertheless, pilots do not particularly like flying in or over clouds—at any rate, until the wireless service has been so far developed that a pilot may at any time, and with a minimum of delay, obtain his bearings by D.W. Progress is being made in many directions, and there is little doubt that before long fogs, clouds and darkness will have lost much of their danger to aircraft. Among the various inventions which have for their object the making safe of flying under such conditions, not the least interesting is the guide cable adapted for aircraft by M. Arthur William Loth, a French engineer. Experiments along similar lines have been made at Portsmouth and in New York, using a cable for directing ships during foggy weather. The problems confronting aircraft are, however, somewhat different, notably

vertical panel, 2 the lateral horizontal panel and 3 the lateral vertical panel. These panels are connected to a telephone receiver, as in ordinary direction-finding wireless, via a commutator, so that the navigator can "listen in" on either of the three panels.

According to the position of the machine in relation to the cable, the intensity in each of the three panels varies or may even disappear. For instance, when the machine is flying parallel to the cable, the sound is a maximum in the longitudinal panel 1, and *nil* in the transverse vertical panel 3. As the machine diverges from the course parallel to the cable, the sound diminishes in the longitudinal panel, and increases in the lateral vertical panel, in which the sound becomes maximum when the machine is at right angles to the cable. The sound in the longitudinal panel then vanishes. The horizontal panel has the property that the sound in it vanishes when the machine is vertically above the cable. It will thus be seen that if an aerodrome has a cable running around it, the navigator of a machine can determine, even in a thick fog, the exact moment of crossing the cable, and by finding the height from the altimeter he can determine at what angle to glide into the aerodrome in order to make a landing.

A special commutator enables the operator to put any two of the panels in series, and the information gained by so doing enables the exact position of the machine in relation to the cable to be determined. Thus, by placing in series



On the left, installation on board the aeroplane for utilising the Loth Guide Cable : 1, longitudinal panel ; 2, horizontal panel ; and 3, transverse vertical panel. On the right, lines showing magnetic field produced in space by the cable.

on account of the third dimension in which an aircraft moves. While it cannot, perhaps, be claimed that M. Loth invented the guide cable, he can, at least, claim the credit of having adapted it for use with aircraft, and the Loth system is, in our opinion, one which is likely to prove of the greatest use in the future. The following notes on the Loth guide cable are based on an article by M. P. James in our excellent French contemporary *l'Aérophile*.

The fundamental principle of the Loth guide cable rests on the fact that if a high-frequency alternating current is sent through a cable earthed at each end, a magnetic field of considerable intensity is created around the cable. The effects of this field can be detected by means of suitable instruments at considerable distances from the cable. Thus if an aeroplane or airship is equipped with these instruments, its navigator can determine his position relative to the cable, and thus ascertain his bearings. Although the principles are very simple, M. Loth was faced with numerous problems before bringing his system to perfection. Thus he had to do a tremendous amount of research and experimental work in connection with the formation and extent of the magnetic field surrounding the cable. This work took a long time, as measurements were often taken at intervals of a metre or so. The lines of force, shown in the accompanying diagram, were found to vary with the frequency of the alternating current sent through the cable. The lines shown in the diagram represent the field resulting from using a frequency of 600 per second.

As regards the equipment of the aeroplane, this is simple in principle, consisting in mounting in a suitable place—for instance, on the tail of the machine—three panels of insulated copper wire so placed as to be at right angles to each other. Thus in the accompanying diagram, 1 is the longitudinal

the longitudinal and transverse vertical panels, the operator can determine whether the machine is inclined to right or left in relation to the cable. In order to determine whether the machine is approaching the cable from left to right, or from right to left, the longitudinal and horizontal panels are placed in series. Placing the transverse and the horizontal panels in series serves to indicate the vertical distance above the cable; in other words, it shows whether the cable is running up or down the side of a hill or mountain, or whether it is running horizontally over flat ground. By the use of the Loth cable, a machine can thus travel along over any sort of country, the navigator knowing his position, and knowing that he cannot accidentally run into a hill in the fog, as his receiver will warn him if he approaches too close to the cable. If this happens while the machine is flying horizontally, he knows that the cable is running up the side of a hill, and if he is on a familiar route he will probably know which is the hill in question. Put in another way, the guide cable is both a direction wireless and a contour map of the route flown.

It goes without saying that the inventor had many difficulties to surmount, difficulties not directly connected with his system, but which had a considerable effect on its development. Thus it was found that the magnetos caused such a noise in the receiver as to drown, or nearly so, the sound from the wireless panels. To overcome this difficulty, it was necessary to explore the magnetic fields of the magnetos thoroughly, and this was consequently done. We do not propose to tire our readers with a technical description of how M. Loth overcame the difficulties. Suffice it to state that he has succeeded in doing so. Not only so, but he has found means of interrupting the sound from the wireless panels for the very short interval occupied while the spark-

ing plugs are giving off sparks. In point of fact, the receiving in the telephone ear piece is intermittent, but the intervals are so short as to be inaudible to the human ear, which hears the receiving as if it were continuous.

Having indicated very briefly the fundamental principles of the Loth guide cable, a few words dealing with the practical results obtained may not be without interest. With the horizontal panel (2) contact with the cable has been established from an altitude of 10,000 ft. With the two vertical panels contact has been attained from a height of about 8,000 ft. At an altitude of somewhat over 6,000 ft., the operator can hear on all three panels, and can begin to

guide the machine without being much disturbed by the various noises on board. At lower altitudes the receiving becomes very loud. When flying at about 6,500 ft., the cable can be "picked up" from a horizontal distance of approximately one mile. As the machine flies lower, what might be termed the "useful zone" increases in width, until at ground level the range is about 9 miles. These results were obtained with an experimental cable of 9,500 ft. in length, and having eight sharp angles in it. The longest straight length was less than 2,000 ft. It is confidently expected that with a proper line, running more nearly straight, and of greater length, even better results will be obtained.

## SOME NOTES ON AEROPLANES, WITH SPECIAL REFERENCE TO THE CROSS-DESERT ROUTE FROM CAIRO TO BAGHDAD

UNDER above title, Air-Commodore H. R. M. Brooke-Popham read a paper before the Central Asian Society on March 9, 1922, the chair being taken by Sir Michael O'Dwyer in the absence of the Rt. Hon. Lord Carnock. The paper was, to all intents and purposes, identical with that read by Air-Commodore Brooke-Popham before the Royal Aeronautical Society on October 6, 1921, a *résumé* of which was published in our issue of October 13, 1921. Thus the bulk of the paper did not contain anything which necessitates dealing with it at length on this occasion. An exception is, however, formed by the concluding paragraphs of the paper, which were not included in the paper as read before the R.Ae.S., and which, as they deal with the subject of handing over the military control of Iraq to the R.A.F., are of interest. This section of the paper is, therefore, printed verbatim below.—Ed.]

As you know, it has been decided by the Cabinet, that the responsibility for the military control of Iraq shall devolve upon the R.A.F. Without entering into a lengthy discussion on this, I should like to indicate one or two of the special advantages of air power in this connection. The normal course of any form of small war in which this Empire engages is roughly as follows:—

Some tribe raids another under our protection, refuses to pay taxes or eats a missionary. After due preliminaries and failure to obtain any apology, an expensive expedition is organised, and, after a lapse of some months, either gains or fails to gain its objective. Even in the former case the tribe that committed the enormity has probably forgotten all about it, and so the effect is not so great as might have been anticipated. The main difficulties are:—(a) The need for a line of communication which has to be guarded; (b) The delay in starting due to large amount of transport and troops that have to be collected and organised, mainly for the L. of C.; (c) The slow movements even after the expedition is ready to start; (d) Natural obstacles met with, e.g., deserts.

Now provided the objective is within, say, 200 miles of their base, aeroplanes have none of these difficulties. They can act within a few days, in some cases within a few hours, of receipt of orders, and they want no L. of C. There must be a great saving not only in time but in money and in life.

As a case in point, may I remind you of the Somaliland operations in January, 1920. The following is an extract from the despatch of the Governor of Somaliland:—

"Second Supplement to *London Gazette*, October 29, 1920.

"Twenty-three days of active operations have sufficed to effect the final overthrow of the Dervish power. For this, credit is primarily due to the Royal Air Force. They exercised an immediate and tremendous moral effect over the Dervishes, demoralising them in the first few days. Our casualties amongst troops were confined to three native ranks killed and eight wounded, and one of the Camel Corps was slightly wounded. Neither the R.A.F. nor the Royal Navy suffered casualties."

Then again, the rapidity with which aircraft can act may be the means not only of preventing a disturbance increasing and becoming a really serious affair, but of nipping it in the bud.

An interesting case was that of Colonel Jacob's Mission, which was interned at Baji near Aden in November, 1919. The local authorities estimated that a whole mixed brigade would be required to rescue this Mission, and I believe this had been actually asked for. It was, however, decided to see what moral effect could be produced by aircraft, and, consequently, two single-seater machines with a total of eight men, were sent on the deck of a steamer and landed on an island, the distance from which to Baji was 55 miles. The succeeding events can now be best described in the form of a diary:—

November 26.—One machine flew over the neighbourhood

of Baji. Colonel Jacob reported no good effect, rather the reverse.

November 28.—One machine flew over Baji and dropped a few bombs in a previously selected spot for demonstration purposes. Colonel Jacob reported excellent results of aeroplane demonstration and a great advance towards settlement.

December 12.—Mission was released without any troops being sent.

The following is an extract from the report of the G.O.C., Aden, on the occurrence:—

"The effect of two flights by a single aeroplane over the hostile tribal area was so great that men, women and children were filled with alarm, and brought to bear immediately the full weight of their influence against continued hostility to the Government."

I have sometimes seen criticisms levelled against the use of aircraft for this sort of purpose on the grounds that they are merely an instrument of terrorism, that bombing is necessarily indiscriminate, and even that any action we take amounts chiefly to bombing women and children. I think this is a most unfair statement to make, and in any case, I fail to see that killing women and children by means of aircraft bombs is more cruel or reprehensible than killing them by means of shells from a gun. However, apart from that I do not believe that aircraft really are going to rely entirely upon terrorism in Mesopotamia, but that they will have a distinct effect in pacifying and civilising a semi-developed country.

There are the opportunities afforded by rapid communication. This will not only enable political officers to visit distant parts of the country at very short notice, but will also afford a means of conveying tribal leaders to the Headquarters of the Government, and thus afford the opportunity of personal interviews with all the benefits that accrue therefrom.

Further, there are the opportunities for doing direct friendly action to individuals in isolated districts; an instance of this has already been referred to.

Time alone can prove the wisdom or otherwise of the decision to make the R.A.F. responsible for the control of Iraq, but all the experience so far available shows that the decision is correct, and that it will result not merely in crushing opposition, but in preventing it, and this I know is the opinion of those best qualified to judge on the spot.

### The Discussion.

The Chairman, by way of illustrating the manner in which risings can be not only suppressed but also prevented by the use of aircraft, related how, in India, there were riots simultaneously in several places and how no garrison troops were available for rendering aid to an outlying post. It was discovered, however, that one aeroplane was available, and this was sent out and succeeded, by dropping a few bombs among the rioters, in quelling the disturbance in a few minutes and thus saved the white population. He related several instances of a similar nature, and succeeded in giving an excellent idea of the very great service which aircraft can do in circumstances such as these. He then called upon Major-General Sir Frederick Maurice to open the discussion.

Sir Frederick pointed out that aviation is as yet only a few years old, and that it is still in a stage of evolution. It is essential, he said, that we keep the Royal Air Force independent of the Army and Navy if it is to develop freely. He had personally had a great deal of experience of the War Office, and in the early days of flying he came back from France very enthusiastic about the possibilities of aircraft, and tried to get the War Office interested. He saw a very high official there, but, after putting his case for aircraft



as strongly as he could, he was told that flying could never amount to anything as far as the Army was concerned, as those who flew were of a peculiar bird-like disposition not usually found in the material of which the Army was composed, and that men with these qualifications would not be forthcoming in sufficient numbers! He referred to the early days of the war, and to what happened at Mons, drawing the moral that aircraft was essential. He also called attention to what had been done by the R.A.F. in various areas in the East, and stated as his firm conviction that had the R.A.F. been under War Office control, it would never have been allowed to go ahead and prove what it was really capable of doing, as it had done under independent control.

Captain P. D. Acland stated that he did not really wish to take part in the discussion, but would confine himself to saying that it seemed to him that the lecturer had proved that there might be very great advantage in carrying out development work by aircraft. This could be done more quickly and cheaply than by other means, and it was a difficult thing to establish railways at high cost before one knew what would be the amount of traffic which the railway, if built, could count upon. In such cases aircraft seemed to furnish a better instrument of development, and that this important fact should not be overlooked.



## THE R.A.F. AND THE MIDDLE EAST

MR. WINSTON CHURCHILL'S statement in Parliament on March 9, and the discussion which followed it in connection with the Supplementary Estimates, shed very valuable official light upon the great success and enormous economy of the utilisation of Air forces in place of the regular Army. Mr. Churchill scored an immense victory in the debate, following his bold experimental policy in giving the R.A.F. the wide latitude for making good which he, in the months past, had confidently prophesied. Mr. Churchill's main references to the R.A.F. and the economies effected by their use were as follows:—

The great factor in these reductions has been the use of air power. With regard to the Air Force, we had six squadrons last year, and we have raised that number now to eight squadrons.

We have eight squadrons all concentrated at Baghdad in a loop of the river, which renders them certainly secure. They constitute the principal agency by which the local levies all over the country are supported, by which the authority of the Arab Government is rendered effective, and by which the frontiers are to a very large extent defended. It is a very powerful concentration. There is nothing like it elsewhere in the British Empire at the present moment. The eight squadrons represent one-third of the whole strength of the Royal Air Force. We propose during the coming year to place the military control and security of Iraq under the charge of the officer commanding the Royal Air Force. That will be much the largest force in the country, and it is only right in that case that command should follow the bulk of the forces there. There will be ancillary units, armoured-car companies, steamboats on the river, and armoured trains, which will all be comprised within the general control of the Air Force, and will look after the mechanical depôts which eight squadrons require. By the time the Air Force take over control there will only be four battalions of troops, and they will be there for the purpose of keeping order in Baghdad and securing the aerodromes from marauders, and not for the purpose of wandering about the country on expeditions.

Colonel Sir C. Yate: Could not the Air Force themselves defend their aerodromes?

Mr. Churchill: I think it is better to have a certain force of men to see to the security of the central organism on which this novel scheme of holding a great country depends. I should like to say how enormously the whole of this reduction of troops has been facilitated by the Air Ministry and by Air-Marshal Sir Hugh Trenchard, whose exploits in the War are so well-known. He, again and again, has had to face the terrible difficulty of actually doing things on the spot in contact with hostile influences. He has thrown himself into this task with extraordinary energy and power, and I am most deeply indebted to him and the Air Ministry for the assistance they have rendered us. It would have been absolutely impossible to secure anything like the saving we have made, if it had not been for their whole-hearted co-operation in a scheme which, after all, is of consequence to the Air Force and to the whole position in the future of our aerial Army. Before I leave the Air Force, I may say that everything goes to show that that force will play a great part in keeping

Brigadier-General Caddell caused much amusement by some humorous remarks regarding the advantage which Air-Commodore Brooke-Popham had over previous travellers over that desert route, such as Alexander the Great, who was tempted into committing bigamy. As the Air-Commodore was single, he was not in danger of doing this sort of thing.

Major Burton related some personal experiences which he and a small survey party had in the same locality, but he said he was sorry to say that the Arabs on this occasion did not adhere to the rules laid down by the lecturer. As a matter of fact, they attacked at 10.30 p.m., and wounded the whole party, and to this day he could not understand how he had managed to escape with his life. There was no time to relate the manner of their rescue, but he would mention that on arriving home he had discovered that his relatives had, at the very instant when his party were being attacked, been uneasy about him and had prayed earnestly for his safety. He did not know what was the opinion of the audience concerning the ethics of prayers, but he was personally convinced that these and nothing else had saved his life. His escape could not be otherwise explained.

The Chairman then asked the audience to pass a hearty vote of thanks to the lecturer for his most instructive paper.

order in these territories—not by violent measures. The mere demonstration of the presence of aeroplanes has again and again been effective in preventing disorder. It has put the civilian officers in close contact with the various tribes, it provides the means of supporting the local levies if outbreaks occur, while it does not involve the movement of bodies of troops and does not place small parties in a position to be cut off and ambuscaded; neither does it involve long, vulnerable lines of communication. It is a very powerful factor which, at present, is only in an experimental stage, but which has been gradually growing in its claim on the confidence of the authorities on the spot during the whole of the present year. I should like to say that the air mail which I indicated was to be started last year is now running with fair regularity from Baghdad to Cairo. Indeed, one individual has actually travelled from Baghdad to London in from six to seven days. The Government's communications with Iraq have been shortened by nearly two-thirds—by a month out of six weeks—and there is no doubt that the civil communications will go that way by this aerial route as soon as it develops a little further.

Major-General Seely: The Secretary of State for the Colonies announced today a very remarkable policy, and one of an entirely novel character.

It is a most interesting experiment. It opens up vistas of economy compared with which anything suggested by the Geddes Committee is really as nothing. If this experiment succeeds, you will be able to do the most astonishing things all over the world in the way of reducing the number of your garrisons, and especially in the way of reducing the number of garrisons in unhealthy places, but do not let anyone think that the Secretary of State's statement will go unchallenged. I know it will be bitterly opposed by all old-fashioned people, and possibly by some others.

Who is right so far as we have been able to go? I have seen a number of people who have come back from Iraq, where this policy is being carried out against the violent opposition of what I must term the War Office—I do not say the present Secretary of State for War, but the old-fashioned military idea. If the War Office are right, we are going to be landed in disaster, and instead of diminishing the cost from £20,000,000 to £2,000,000 we shall land ourselves into untold millions of expenditure, but, if they are wrong, we are going to save all this money and administer the country in a more economical and merciful fashion.

Let us see what has happened so far. During the past year there have been four little rebellions, and the Secretary of State told us that, so far as is known, the casualties have been in the neighbourhood of three or four killed and three or four wounded due to air accidents. At a place called Naziriyah there was trouble. If it had not been for aeroplanes, we should have sent an expedition which would have taken several weeks to get there, and there would have been considerable casualties, but on this occasion aeroplanes flew over and dropped a warning. At the appropriate interval they came back and dropped a more efficient form of warning in the shape of a bomb or two, and the very next day the inhabitants came in and apologised and surrendered. That was in

September last. There is another place called Bani Said, where an exactly similar thing happened in the last year. There again a warning was conveyed by aeroplane; there again the political officer himself went to the place, or as near as he could, to explain to them that they really must keep the peace; there again it was necessary to take hostile action in the form of dropping bombs upon such bodies as could be seen; and there again within a week the whole body came in and surrendered. Now I will come to this year. All this I have heard from people who have been on the spot. Not far from Basra, as distances go in that country, a tribe went into open rebellion; that is to say, they refused either to pay taxes or to allow the District Commissioner to approach the place, or any political officers to go there. Again, we sent a warning by aeroplane, and again, the warning not having been attended to, aeroplanes were sent for hostile action, and yet again within a week the whole party came in and surrendered.

It may be said that all these are places in the plains—and that is so—but what about Kurdistan, of which we heard a good deal from Mr. Asquith? There are steep mountains there, where, it is said, aeroplanes are valueless, but, really, it is quite the other way; according to my information, the argument is all the other way. It is just in those mountainous regions that the advance of troops is so dangerous, as in the defiles on the Indian frontier. But if you adopt the entirely new methods of strategy involved in attacking from the air, you do not attack the enemy by means of a prolonged expedition. The last time I spoke on this question and urged that this policy should be adopted, little knowing how soon it would be adopted, we had not got such good concrete cases as we now have. The Sulaimaniyah, in Kurdistan, rebelled three years ago. We had to send an

expedition at once. There were very heavy casualties, and it took six weeks to restore order by flying columns operating at extraordinary speed. Exactly the same type of thing happened in the same region with the same people last January. Air power was, however, employed, and the warning was issued within a day. The result not being satisfactory, an attack was delivered within 48 hours, and as these gentlemen did not surrender a further attack was delivered two days later, on this occasion the attack being delivered from Baghdad, 160 miles away, without the machines ever coming down, and within a few days the whole party again surrendered, and are now loyal and, let us hope, contented subjects.

I cordially congratulate the Secretary of State for the Colonies and the Secretary of State for Air on the success which has so far attended their efforts, beg of them not to relax them, especially not to be afraid of the formidable attacks which will come from old-fashioned people, and assure them that there is a great body of opinion in this House which will back them up with all its power in adopting and developing this efficient and merciful means of maintaining our Empire.

I congratulate the Secretary of State on his imagination in utilising the Air Force as policemen in this country. This is a red-letter day in the military history of the world, because for the first time we see this new young Air Force taking charge of a big country with the older service ancillary to it.

The Air Force during the War worked practically entirely for the Army. In this particular scheme the Army has to co-operate with the Air Force, and the success of the venture now being tried can be made or marred by the Army. I hope it will do its best to help the venture in every way.

## THE GEDDES NATIONAL EXPENDITURE CUTS AND AIR ESTIMATES

In dealing with the Geddes report in Parliament last week, Sir R. Horne, when referring to the case of the Air Ministry, said: "I will turn now to the question of the Air Force. There the cuts recommended are £5,500,000, but, as before, £1,000,000 of that is unspecified. The Air Ministry proposes a reduction of £3,000,000, so that the comparison is as between £3,000,000 on the one hand and £4,500,000 on the other. The Air Force have made great efforts to economise. They are reducing the £18,500,000 Estimate of this year to £10,500,000 in the next year, giving a reduction of 43 per cent."

"It may be questioned, as I gather from some hon. members behind me, whether we are not running great risks in going so far in these reductions. We have looked at the problem, weighing, on the one hand, the necessities of our country, and, on the other hand, the position of financial stringency in which we find ourselves, and we give these recommendations to the House as those which, we believe, can be most justified in the condition in which we now are. It was suggested by the Geddes Committee that there should be set up a Ministry of Defence. That would not immediately have the result of bringing about great economies in the public service, and it is obviously a matter which requires very careful investigation and great consideration before any plan can be adopted. The whole question is to come up for consideration at the Committee on Imperial Defence."

Capt. Wedgwood Benn during the debate said:—"I wish to refer to another matter which forms one of the subjects dealt with in the Geddes Report—I mean the continued existence of a separate Air Service. If the Under-Secretary of State for War is able to say in reply to my question that it is the Government's intention to maintain the integrity and independence of the Air Service, I shall not trouble the House with any further remarks."

The Under-Secretary of State for War (Lieut.-Col. Sir R. Sanders): "That is so."

Capt. Benn: "If that is the case, then I have nothing further to say."

Sir R. Sanders: "I do not want to give a definite assurance of that kind in answer to a question without careful consideration, but I understand it is so, and that the Air Service will continue as an independent service."

Capt. Benn: "If that be so, then I should not dream of troubling the House with any further remarks. That is an extremely satisfactory statement in view of the doubts that have been thrown upon the future existence of the Air Service. If the hon. gentleman states that there is no intention of interfering in the matter, that assurance is extremely satisfactory."

Sir R. Sanders: "That is my belief at the present moment."

## IN PARLIAMENT

### Airships

MR. GILBERT, on March 8, asked the Secretary of State for Air how many airships are in the possession of his Department at the present time; whether all or any of them are of German make; if it is proposed to retain all of them for air-service work or if any of them are to be disposed of; and, if so, how many?

Captain Guest: The answer to the first question is five; to the second, one; to the third, that it is not proposed to retain any of them for Air Force work, and that in view of the present need for economy and of the inability of India and those Dominions from whom replies have been received to contribute towards their operation on Imperial air routes, it has with great regret been decided to pass them all for disposal. This process must necessarily take a few weeks, and during that time it is, of course, still possible for offers to be made with the object of running an airship service.

Sir J. Norton-Griffiths: Does my right hon. friend's undertaking given at the Guildhall that this material would not be disposed of before June hold good?

Captain Guest: No. There is some slight misunderstanding about it. We hoped that the further delay would be of value to the other Dominions, as no reply had been received then. Since then I have received a reply, and there is no object in keeping this material any longer.

Major-General Seely: Even if we dispose of the airships, will we retain at least a proportion of the skilled personnel, and the research staff to enable us to resume activities in case of necessity?

Captain Guest: In spite of the small monetary grant for this purpose, an effort will be made to retain some of the skilled members of the staff in maintenance and other parties.

Captain Viscount Curzon: Have the Admiralty concurred in this decision?

Captain Guest: The Admiralty views were represented a great many months ago, when their statements were considered very carefully.

### Depôts or Air Stations

MR. GILBERT asked the Secretary of State for Air how many depôts are now maintained for the Air Force in Great Britain; how many air stations are also provided, and can he state approximately in what parts of England and Scotland they are situated; and if it is proposed to give up any of these depôts or stations, and, if so, how many?

Captain Guest: The answer to the first question is 7; to the second, 32, of which two are situated in Fifehire, one in Flintshire, and the remainder in the counties east of a line drawn from Lincoln to Plymouth; to the third, that one air station will be relinquished in May next, and four others will be reduced to a care and maintenance basis early in April next.

### R.A.F. Recruiting

LIEUT.-COLONEL CAMPION, on March 9, asked the Secretary of State for Air the amount of money expended in recruiting advertisements during the current financial year, and the number of recruits obtained?

Captain Guest: It is estimated that expenditure on recruiting advertisements for the Air Force, including posters, films, etc., will be £15,000 on Air Votes





in the financial year now ending, and £3,000 on the Stationery Office Vote. During the first 11 months of the year some 6,320 recruits have been obtained.

Captain Viscount Curzon: Would it not save money to combine with the Navy and Army in this matter of recruiting posters and so on?

Captain Guest: That is one of the matters which are receiving the close attention of the Government.

Colonel Ashley: Could the right hon. gentleman say why it costs so much more to get recruits for the Air Force than for the Army?

Captain Guest: The type of recruits that we require is of a very high standard.

#### Halton Buildings

MR. G. LOCKER-LAMPSON asked whether it is proposed to proceed with the large expenditure upon buildings at Halton?

Captain Guest: The answer is in the affirmative. The buildings are four-fifths completed, and to stop now would be a very false form of economy, since provision would have to be made elsewhere for the training of these boys.

#### Air Attachés

MR. RAPER asked how many air attachés there are; what are their duties; and what is their remuneration in the aggregate and individually?

Captain Guest: There are two air attachés, at Paris and at Washington, and their duties are to keep His Majesty's Government in touch with the developments of aviation in all its aspects in the countries to which they are accredited. Their remuneration consists of their ordinary Air Force pay, together with a foreign allowance (also admissible for naval and military attachés) of £5 a day at Washington and £4 at Paris, inclusive of entertainment and all other allowances, except travelling allowance for journeys outside the capital city.

Mr. Raper: Is it not the fact that France, which is so far ahead of us as regards progress in aviation, has already decided to dispense with air attachés, as being unnecessary?

Captain Guest: I am not aware of the point raised by my hon. friend, nor am I prepared to admit that France is so far ahead of us in aviation.

#### Royal Air Force Sports Board

R.A.F. Boxing Association.—The Annual Air Force Individual Boxing Championships will take place this year in the R.A.F. Depot Gymnasium at Uxbridge, on April 6 and 7. Entries are unlimited for both officers and airmen, but the weights for officers are confined to heavy, middle, welter, light and feather. Entries should reach the Hon. Sec., R.A.F., B.A., not later than March 31.

#### Air Board in India

In the Summary for the half-year to December last of the Air Board it is stated that in September, 1921, the administration of Civil Aviation was transferred from the Department of Commerce to the Public Works Department.

The Air Board now consists of the following members:—

President.—Colonel Sir Sidney Crookshank, K.C.M.G., etc.

Members.—Mr. G. R. Clarke, C.S.I., C.B.E., I.C.S.; Mr. E. Burdon, C.I.E., I.C.S.; Air-Commodore J. I. Webb-Bowen, C.B., C.M.G.; Doctor G. T. Walker, C.S.I., F.R.S.; Mr. R. P. Hadow, Secretary.

The programme for the year 1922–23 has been discussed, and the board has decided to recommend the following expenditure:—

(1) Balance of expenditure on Allahabad Aerodrome, Rs. 5,000; (2) Upkeep of existing aerodromes, Rs. 10,733; (3) Investigation of accidents, Rs. 5,000; (4) Investigation of conditions affecting aircraft in India, Rs. 77,000; (5) Calcutta-Rangoon route, Rs. 500,000; (6) Share of expenditure on Cairo-Karachi route, Rs. 12,400; total: Rs. 610,133.

This, with an allowance of Rs. 21,760 for establishment, amounts to Rs. 631,893, but it is considered unlikely that funds will be available for this programme.

#### The Part of 'Planes at Johannesburg

'PLANES quickly brought into action in the Rand mine strikes have without question helped to bring much nearer the end of the trouble than could otherwise have been the case. In their use there is an uncanny persuasiveness to respect the peace—keeping powers that be and the community's laws, which the red Bolshie finds it difficult to resist—yet the average "superior" man will still ask "What's the use of aircraft, anyway?" It is very regrettable that so good an officer as Capt. Carey Thomas should have been reported killed in the attacks.

The following item, from an official communique issued from Pretoria on the 12th, reflects the effects upon the rioters of the use of aeroplanes: "The revolutionaries in the Brixton area surrounding two squadrons of police who have been holding out most gallantly for the last day or two were heavily bombed at daybreak today, thirty-two bombs being dropped, causing a large number of casualties. This effectually reversed the position, many of the revolutionaries surrendering to the police and others taking shelter in the native location, where they were safe from the bombing."

#### The Monaco Meeting

THE following list of entrants for the "croisière" Marseilles-Monaco is now announced: 1, Chantiers de la Méditerranée, Maicon, on E. Romano type R.I., 130 h.p. Clerget; 2, G. Minier, Minier, on Farman type F.40, 80 h.p. Renault; 3, Caudron, no pilot announced, Caudron type C.66, 140 h.p. Hispano-Suiza; 4, Caudron, no pilot announced,

Mr. G. Murray: What is the rank of these two officers?

Captain Guest: To the best of my recollection, one is an air commodore and the other a group captain.

Mr. Raper: If, as I suggest, France has withdrawn her air attachés as unnecessary, will the right hon. gentleman consider doing the same?

Captain Guest: We will certainly consider it.

Rear-Admiral Sir R. Hall: If it be the fact that France is withdrawing her air attachés, could the right hon. gentleman ascertain who is doing the work?

Captain Guest: I feel convinced that the work is being done by somebody

#### Round-the-World Flight

MR. RAPER asked whether the proposed flight round the world to be undertaken by Sir Ross Smith will be financed or subsidised in any way by His Majesty's Government?

Captain Guest: The answer is in the negative.

#### Air Estimates

MR. G. LOCKER-LAMPSON asked whether the Air Estimates for 1922–23 have been framed in accordance with the Cabinet instruction of 1919, on the assumption that no great war is to be anticipated within the next 10 years?

Captain Guest: The answer is in the affirmative.

#### The Air Ministry

COL. MILDMAY, on March 13, asked the Prime Minister whether, in view of the prospective Debate on the Air Estimates on Monday next, he can find it possible to lay upon the Table of the House the memoranda of the First Sea Lord and of the Chief of the Imperial General Staff—if such were compiled for the information of the Cabinet—with reference to the policy of terminating the existence of the Air Force and Air Ministry as at present constituted, and of merging the force in the Navy and Army?

Mr. Chamberlain: No, sir; without saying whether or not papers have been laid, I think my hon. friend will see that I could not undertake to publish papers which, if presented at all, would be of a most confidential kind relating to questions of public defence, and must be so treated.

Caudron type C.65, 130 h.p. Clerget; 5, Marcel Besson, Jules Duclos, on Marcel Besson, 130 h.p. Clerget; 6, Cie. des Transaériens de tourisme et Messageries, Clot, on Savoia S.13, 250 h.p. Isotta-Fraschini; 7, Société Breguet, Thierry, on Breguet 14T bis, 280 h.p. CV. Renault; 8, Caudron, no pilot announced, Caudron C.39, 3-130 h.p. Clerget; 9, Drouilh, Henry Drouilh, on Georges Levy, 300 h.p. Renault; 10, Aero-Navale, no pilot or machine announced, one 300 h.p. DD. and two 270 h.p. Hispano-Suiza; 11, Aero-Navale, no pilot announced, Liore and Olivier, one Salmson 250 h.p. and two Hispano-Suiza 300 h.p.

#### Enterprise

A STRIKING instance of the way in which the use of aircraft can accelerate communication was furnished by the de Havilland Hire Department in connection with the delivery of films of the Royal wedding. Four machines were used for conveying films of the wedding to Manchester, Newcastle and Leeds, with the result that the films were being shown in those towns shortly after 6 p.m. on the same day. G-EBAW, piloted by Wilson, left at 2 p.m. for Manchester, arriving at 3.59 p.m. At 2.55 p.m. G-EAYU, piloted by Cobham, left for Newcastle, arriving at 5.50 p.m. Broad, on G-EAAC left for Manchester at 3.25 p.m., arriving at 5.30 p.m., and at 4 p.m. Barnard left on G-EBAX, arriving in Leeds at 5.45 p.m. In no other way would it have been possible to get the films to these towns in anything like so short time, and the de Havilland Aircraft Co., no less than the film company, are to be congratulated on their enterprise. The performance, apart from the immediate object in view, was one of great value, as demonstrating the very practical value of "hustling" by air.

#### Royal United Service Institution Prize

THE result of the Prize Essay Competition for 1921, organised by the Royal United Service Institution, upon the subject of "The Influence of the Future of Aircraft on Problems of Imperial Defence," was announced at the anniversary meeting of the Institution last week. The Council have awarded the Gold Medal of the Institution and a prize of thirty guineas to Flight-Lieut. Mackay, R.A.F., and prizes of twenty and ten guineas to Squadron-Leader Walser, R.A.F., and Capt. the Hon. R. Plunkett-Ernie-Drax, R.N., Director of the Naval Staff College, respectively. The judges of the competition were Air-Marshal Sir H. Trenchard, Maj.-Genl. Sir P. Radcliffe, and Rear-Admiral Fuller, to whom a hearty vote of thanks was accorded.

#### Aeroplane Tent-pegging.

WONDERFUL possibilities are suggested by the unpremeditated removal by the Bristol 10-seater of Handley-Page Transport, of a portion of Le Bourget aerodrome last week. The incident is referred to under our London Terminal Aerodrome Notes, but we now learn that, as a matter of fact, it was not a single post carried away by the machine but three large planks, measuring 7 ft. by 9 in. by 2 in. thick. The pilot was entirely unaware of their presence in the undercarriage until, on landing at Croydon, one of them perforated the lower plane. How the planks got into the undercarriage is still a mystery, but the incident seems to indicate unusual strength in the Bristol. Apart from the punctured lower plane no other damage was done to the machine.

## LONDON AERO-MODELS ASSOCIATION

THE General Purposes Committee have been engaged at the last two meetings preparing a programme of competitions for the ensuing six months. A copy of the same will be sent to all members in due course.

On March 25 at 6 p.m., a Propeller Competition will be held at Club Headquarters. Entry forms and full particulars of same to be had from the Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N. 19.

The Official Observer for the South-West District, Mr. D. A. Paveley, gave a lecture on Tuesday evening, March 7,



A fine cup which has been presented to the London Aero-Models Association by Mr. Felix Kelly for the best duration flight with a compressed-air-driven model.

to the Meccano Boys at Emanuel College, Wandsworth, the subject being "Early History of Flight, Heavier-than-Air Machines, incorporating Model Aeronautics." At the conclusion there were many enquiries from possible recruits to membership of L.A.M.A.

Rule No. 3 of the Association states that "members not having paid their subscriptions to date, shall not be eligible to vote at meetings, or participate in competitions."

Meetings held at Headquarters every Thursday evening, 20, Great Windmill Street, Picadilly, W. 1, at 7.30 p.m.

Full particulars can be had from the Hon. Secretary, Mr. A. E. Jones, of 48, Narcissus Road, West Hampstead, N.W. 6

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### Gliders

In view of the activity in gliding experiments in other countries, it has been suggested that facilities should be offered in this country to those who are interested in these experiments.

The Royal Aero Club, 3, Clifford Street, London, W. 1, will be pleased to hear from all those who contemplate taking an active interest in gliders.

### German Air Enterprise in Colombia

CONFIRMATION has been received through the British Department of Overseas Trade that a contract has been drawn up between the Colombian Government and the Sociedad Colombo-Alemana de Transportes Aereos, whereby the company will operate a weekly air mail service from Barranquilla to Neiva and *vice versa*, with numerous intermediate landings, in return for a small subsidy. This service and another between Barranquilla and Cartagena were in actual operation in January, although at that time the contract still awaited the sanction of the Government. Apparently the affair is a very live proposition, from particulars recently to hand.

### Mid-Air Collision Fatality

FROM Allahabad it is reported that on March 3 two aeroplanes, returning from Lahore to Ambala, collided at an altitude of 4,000 ft. and crashed to the ground, near Amritsar. The four occupants, Flight-Comdr. Fox, Flying Officer Buckland, Sergt. Hemings and Air-Mechanic Richardson, are stated to have been killed instantaneously.

## IMPORTS AND EXPORTS, 1921-1922

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; and for 1921, see "FLIGHT" for January 19, 1922.

	Imports		Exports		Re-Exportation	
	1921.	1922.	1921.	1922.	1921.	1922.
	£	£	£	£	£	£
Jan. ...	4,459	1,152	87,128	76,552	2,285	23
Feb. ...	2,379	567	59,829	69,129	19	1,100
	6,838	1,719	146,957	145,681	2,304	1,123

## PUBLICATIONS RECEIVED

*Cours Pratique d'Aviation.* By Capt. Gambier and Lieut. de Vaisseau J. Amet. Librairie Delagrave, 15, Rue Soufflot, Paris. Price 12 fr.

*La Photographie Aérienne.* By A. H. Carlier. Librairie Delagrave, 15, Rue Soufflot, Paris. Price 28 fr.

*Scientific Papers of the Bureau of Standards.* No. 427. *Some Effects of the Distributed Capacity between Inductance Coils and the Ground.* By G. Breit. Department of Commerce, Bureau of Standards, Washington, D.C., U.S.A.

*Transactions of the Institution of Engineers and Shipbuilders in Scotland.* Vol. LXV, Part V. March, 1922. Institution of Engineers and Shipbuilders in Scotland, Elmbank Crescent, Glasgow.

*Technical Note No. 85. Air Force and Three Moments for "F-5-L" Seaplane.* National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

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## AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

### APPLIED FOR IN 1920

Published March 16, 1922

- 23,359. J. DEMOCRATIS. Parachutes. (175,308.)  
 31,141. GOODYEAR TYRE AND RUBBER CO. Airships. (154,578.)  
 31,738. W. GRUNOW. Devices for transference of articles between aircraft and vessels at sea. (175,367.)  
 31,911. F. W. SCARFF. Control of aircraft. (175,378.)

### APPLIED FOR IN 1921

Published March 16, 1922

- 1,070. N. BASENACH. Airship anchoring devices. (157,198.)  
 8,678. ARMSTRONG-SIDDELEY MOTORS, LTD., and F. M. GREEN. Air-cooled I.C. engines with radial cylinders. (175,554.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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